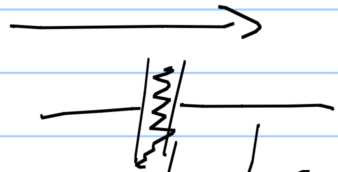
Lecture 13:

Note Title 10/21/2009

1. Caps
2. Ind

Cap Diagram



2 par plates

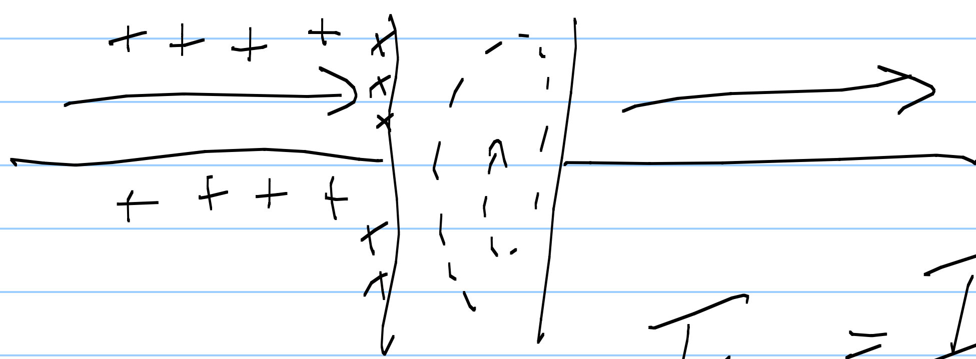
w/ dialectric

apply I

Maxwell:

diaeletric creates

"displacement" I



$I_{in} = I_{out}$

Have NRG storage device

Farad: unit of measurement

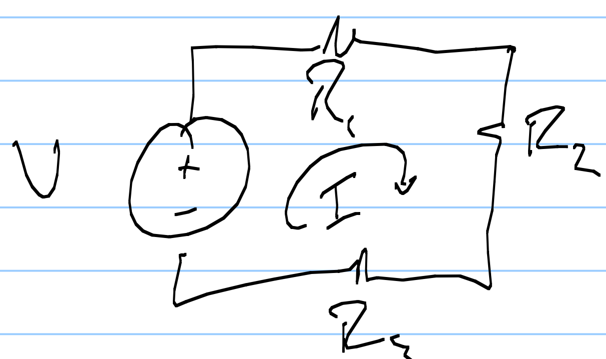
$$C = \frac{\varepsilon A}{D}$$

ε : dialectric

A : area of plates

D : distance between plates

Voltage in Caps

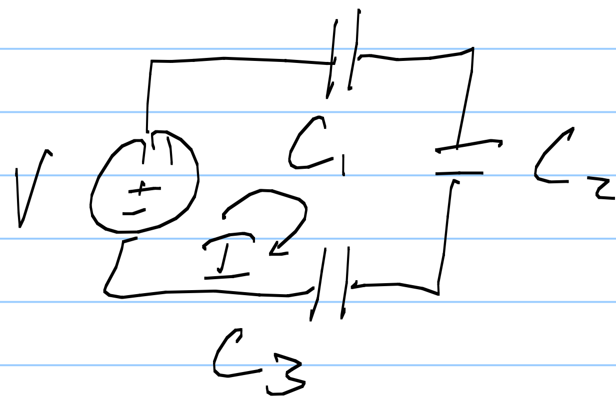


KVL

$$V = V_1 + V_2 + V_3$$

ohm

$$V = R_1 I + R_2 I + R_3 I$$



KVL $V = V_1 + V_2 + V_3$

~~$V = C_1 I + C_2 I + C_3 I$~~

ohm's law is for R

Current

$$i_c(t) = C\frac{dV_c(t)}{dt}$$

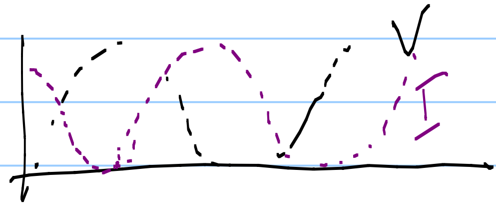
i in a cap is related to a Varying V

@ DC: V = DC ∴ I = 0
open

if $V_c = 2\sin(t)$

$i_c = C \cdot 2\cos(t)$

SO i is delayed from V



What happens if instant change on V? →

Voltage: $v(t) = \frac{1}{C}\int_0^t i(t)\,dt + v(t_0)$

NRG:

$$p(t) = v \cdot i$$

$$= C v \frac{dv}{dt}$$

$$w(t) = \frac{1}{2} C v^2$$

Combo: opp of R

Par: $C_{eq} = C_1 + C_2 \cdots$

Ser: $C_{eq} = \left[\frac{1}{C_1} + \frac{1}{C_2} \cdots\right]^{-1}$

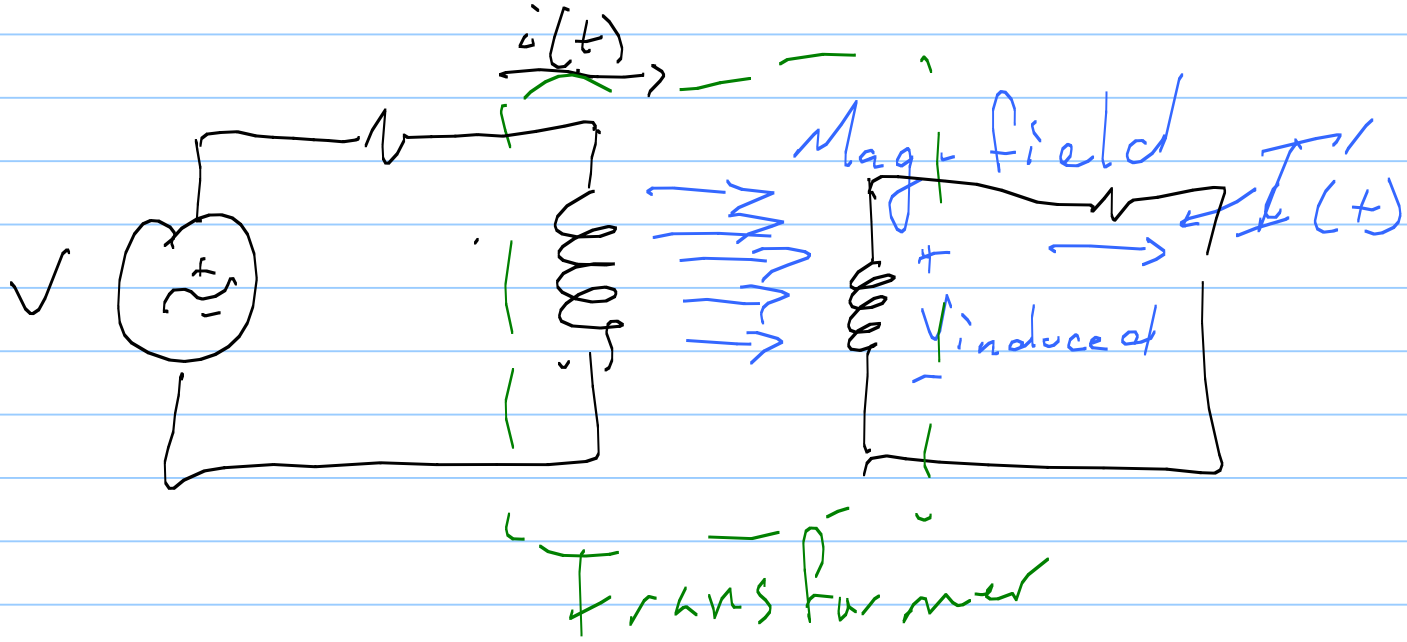
2 INDUCTORS

Mag Theory

1. A changing I through a cond. creates a Mag Field

2. A changing Mag-Field creates a voltage

3. To strengthen the Mag-Field coil the wire



Measurement:

Henry

calc similar to Farads

typical values: 0.1 - 10 H

Voltage

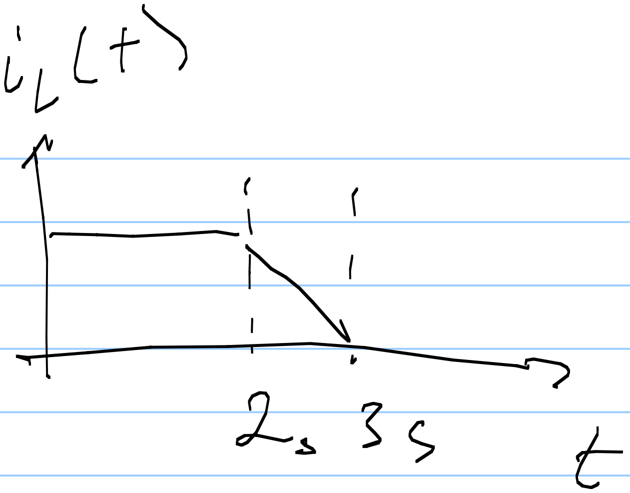
$$V_L(t) = L \frac{di_L(t)}{dt}$$

if I is DC

$V = 0 V$ short

instant change in I ?

Ex



$v(t)_1 = 0V \Big|_{0 < t < 2}$

$v(t)_2 = ? \Big|_{2 < t < 3}$

Current:

$$i(t) = \frac{1}{L} \int v(t)\,dt + i_0(t)$$

Power:

$$p(t) = L i \frac{di}{dt}$$

NRG: $w = \frac{1}{2} L\, i(t)^2$

combos! same as R's

V

I

P

W

DC value

Instant change